

The Power Of: VisiCalc®

A	B	C	D	E	F	G
MAX NUMBER OF SHOP HOURS IN A WEEK =				200		
MONTH		12	MONDAYS DATE		23	
JOB NO	CUSTOMER	PATTERN MAKING	CUT GLASS	ASSEMBLE	SHIP	EST. HOURS
A300	JONSON	4	5	25	5	133
D325	MCGRAY	15	5	30		70
D450	MIS CO.	17		5		44
TOTALS		77	95	70		247
MONTH		1	MONDAYS DATE			
JOB NO	CUSTOMER	PATTERN MAKING	CUT GLASS	ASSEMBLE	SHIP	EST. HOURS
A150	MILORD	25	3	18	1	75
A550	RESTEASY			27	1	64
D600	HARTFORD			15	1	47
TOTALS		55	68	60	3	186
MONTH			MONDAYS DATE		6	
JOB NO.	CUSTOMER	PATTERN MAKING	CUT GLASS	ASSEMBLE	SHIP	EST. HOURS
A800	RED FOX	15	20	12	1	48
D425	WILLIT	13	15	15	1	44
A225	DONIT	1	12	5	1	19
TOTALS		29	47	32	3	111
PLANT PRODUCTION SUMMARY						
MONTH	WEEK OF	PATTERN MAKING	CUT GLASS	ASSEMBLE	SHIP	EST. HOURS
12	23	77	95	70	5	247
12	30	55	68	60	3	186
1	6	29	47	32	3	111
TOTALS		161	210	162	11	544

One of a series of instructional manuals on the use and application of computer programs.

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The Power of: VisiCalc[®]

by
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MANAGEMENT INFORMATION SOURCE

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One of a series of instructional manuals on the use and application of computer programs.

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PREFACE

The Power Of:VisiCalc is a book of exercises designed especially for users and potential users of the VisiCalc computer program. By performing these simple step-by-step exercises, you will rapidly gain an ability to utilize the broad range of VisiCalc capabilities that make it the most powerful software program available for personal size computers.

Better than an instruction book, The Power Of:VisiCalc demonstrates the use of VisiCalc features through specific application samples.

The Power Of: VisiCalc will show you how to expand your use of VisiCalc, no matter what you application. These seven easy to follow exercises are designed to help you understand and use VisiCalc operations. Business owners, accountants, financial analysts, homeowners, manufacturers, engineers, educators, scientists, architects, students, or anyone with a problem that can be solved using a computer, will find The Power Of: VisiCalc an invaluable companion to their VisiCalc program.

No special training is needed to benefit from the exercises in The Power Of: VisiCalc. All instructions are in plain english. The logic of each step is clearly spelled out, so you can later apply the information to your specific needs. The Power Of: VisiCalc will become your most valuable reference book as you expand your use of VisiCalc.

IF YOU OWN, OR ARE THINKING OF OWNING VisiCalc,
YOU SHOULD OWN THIS BOOK!

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FOREWORD

We feel the real power of VisiCalc is that it brings, for the first time, some of the fantastic capabilities previously available only on very large computers to the personal-size microcomputers available to everyone. You can now have many of the problem-solving capabilities that have been changing the world through the use of computers at your fingertips in your own home or office.

We think VisiCalc is one of the most exciting developments in computer use in years. No special training is necessary for you to use it. Business managers, manufacturers, accountants, scientists, educators, engineers, architects, homeowners, students and many others, will find VisiCalc to be a valuable tool for work or play. We feel the day VisiCalc became available to microcomputer users should be recorded in the annals of computer history. It may prove to be the turning point of the computer age we've been promised for so long.

We have been using VisiCalc in our business consulting work for more than a year. We have not yet discovered its limitations for problem solving. We have discovered, however, that few people are utilizing more than a small percentage of their VisiCalc program capabilities. Users, it appears, have not been made aware of the flexibility within VisiCalc beyond the problem they originally purchased their program to solve. We have been unable to find instructional material for small computer users or would-be users that demonstrate VisiCalc's functions in a manner that allows the reader to combine those functions into a wide range of applications abilities. It was with the intention of filling that need that this book was written for our clients and friends.

This book was written with a great deal of excitement and enjoyment as we experienced the thrill of success each time we discovered and found a way to illustrate a new VisiCalc ability. We hope its use will provide you with the same enjoyment as you employ the skills you learn using it to expand your world of problem solving.

Portland, Oregon
December, 1981

Robert Williams
Bruce Taylor

INTRODUCTION

The exercises in this book have been purposely designed to provide an opportunity to easily follow the logic of VisiCalc functions, then have the ability to apply those functions to specific problem-solving situations. Each exercise is self-contained. Each demonstrates some special ability or abilities we have used in solving client's problems. The discovery of some of these abilities, we feel, is unique to our use, since we have not found anyone else who knows of their existence.

The VisiCalc format is arranged on the computer screen in columns and rows. The VisiCalc format is illustrated in figure 1. The columns are identified by letter designations, the rows by numbers. Each position where a column and row intersect is a coordinate, or location, like on a street map. The relationships between values in these coordinates is determined by simple instructions entered into the coordinates in the form of algebraic formulas (don't get panicky, that just means $(a+b)$ and other similar expressions). Visualizing the street map image and following the exercises, you will easily and quickly catch on to the power of VisiCalc and how it can work for you.

	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

FIGURE 1.

EXERCISE 1

DESCRIPTION

The VisiCalc ability to move specific blocks of data to disk storage has been employed in this example to shift values from one area of the worksheet for reentry in other worksheet areas for referencing and for use in formulas.

To demonstrate ways this technique may be employed, an Accounts Receivable Ageing Report ledger has been set up. To age the accounts listed, an updating operation is performed once a month. Current accounts and those over 30 days old, along with a blank column immediately to their left, are moved to a storage disk, then reentered on the ledger sheet, repositioned one column to the right. The over 60 day and over 90 day values are moved to a storage disk, then reentered in a WORK AREA for an accumulating function.

Operations Used

1. Setting Up The Format
2. Entering Mathematical Formulas
3. Making Ledger Entries
4. Ledger Updating
5. Making Monthly Entries
6. Making Additional Entries
7. Saving
8. Printing

Functions Used

SUM
#

Commands Used.

REPEATING LABEL	
FORMAT	(R = right justify)
GLOBAL	(\$ = dollar and cents format)
STORAGE	(#)
REPLICATE	(copy)
INSERT	(R = row)
DELETE	(R = row)

SETTING UP THE FORMAT

To set up your ledger sheet, copy figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

	A	B	C	D	E	F	G	H	I	J
1	CUSTOMER		CURRENT	OVER 30	OVER 60	OVER 90	TOTAL		WORK	AREA
2	NAME		BILLING	DAYS	DAYS	DAYS	DUE		OLD 60	OLD 90
3	-----								-----	
4										
5										
6										
7										
8										
9										
10										
11										
12	=====									
13										

FIGURE 1

To format all locations to display value entries in dollars and cents, type:

```
/G      (start global command)
F       (format)
$       (dollars and cents)
```

To enter your column headings, place your cursor where you wish to make the entry and type:

```
/F      (start the FORMAT command)
R       (justify right)
```

Type in your column title.
Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column title into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your ledger sheet, place your cursor in the left-most column of the row where you want the line (line A3 in this example). Type:

```

/-      (start REPEAT LABEL command)
-      (label to be repeated)
RETURN  (actuates the command)

```

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, leave your cursor where it is and type:

```

/R      (start the REPLICATE command)
RETURN  (tells the command to copy the
         dashed line your cursor is on)
B3      (the first coordinate in which you
         wish the dashed line to be extended
         from)
.       (elipsis ... indicating from-to)
J3      (the last coordinate in the row you
         wish the dashed line to be extended
         to)
RETURN  (actuates the command)

```

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the ledger sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their locations are illustrated in figure 2.

	A	B	C	D	E	F	G	H	I	J
1	CUSTOMER		CURRENT	OVER 30	OVER 60	OVER 90	TOTAL		WORK	AREA
2	NAME		BILLING	DAYS	DAYS	DAYS	DUE		OLD 60	OLD 90
3	-----									
4				+I4+J4		0.00	0.00		@SUM(C4...F4)	
5						0.00	0.00			
6						0.00	0.00			
7						0.00	0.00			
8						0.00	0.00			
9						0.00	0.00			
10						0.00	0.00			
11						0.00	0.00			
12	=====									
13			0.00	0.00	0.00	0.00	0.00			

@SUM(C3...C12)

FIGURE 2

The first formula will add the values in the CURRENT BILLING column.

Place your cursor on C13 and type:

@SUM(	(add)
C3	(first coordinate of the column you wish to add)
.	(elipsis ... indicates from-to)
C12)	(last coordinate of the column you wish to add)
RETURN	(actuate-enters the formula in C13)

Your next operation is to copy the formula just entered at the bottom of each column you wish to add.

Leave your cursor on C13 and type:

/R	(start the REPLICATE command)
RETURN	(actuate-tells the command to copy the formula in C13)
D13	(first coordinate where you wish to copy the formula across columns)
.	(elipsis-indicating from-to)
G13	(last coordinate where you wish to copy the formula across columns)
RETURN	(actuates the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
R	

The third formula will add the values in the two WORK AREA columns, and display the answer in the OVER 90 DAYS column. This value will reflect the accumulated value of accounts receivable held more than 90 days.

Place your cursor on F4 and type:

+	(prepares the coordinate to accept a numeric expression)
I4	(coordinate to add)
+	(add)
J4	(coordinate to add)
RETURN	(actuate-enters the formula in F4)

Next, enter a formula in the TOTAL DUE column to add the SUM of the values in each column in the row to the left.

Place your cursor on G4 and type:

@SUM(	(add)
C4	(first coordinate of
.	the row you wish to add)
	(elipsis ... indicating
	from-to
F4)	(last coordinate of
	the row you wish to add)
RETURN	(actuate-enters the
	formula in G4)

It will now be necessary to copy the two formulas just entered into each row in their respective columns (OVER 90 DAYS and TOTAL DUE).

Place your cursor on F4 and type:

/R	(start the REPLICATE
	command)
G4	(copy all entries across
	columns F4 to G4)
RETURN	(actuate-prepare to
	receive additional
	instructions)
F5	(first coordinate where
	you wish to copy the
	formulas down columns)
.	(elipsis ... indicating
	from-to)
F11	(last coordinate where
	you wish to copy the
	formulas down columns)
RETURN	(actuate the command)
R	(tells the command to
	copy the coordinate
	address in the formula
R	relative to its new
R	location)
R	

MAKING LEDGER ENTRIES

Your Accounts Receivable Ageing Ledger is now set up. Once a month, all you have to do is perform the update process, described in the next section, and make current billing entries. To perform the following series of exercises, type in the entries illustrated in figure 3. For this example, entries have been selected to illustrate a ledger in operation more than 90 days.

NOTES: Do not type in the OVER 90 DAYS column. The value to be shown in the OVER 90 DAYS column should be typed in the adjacent row of the OLD 90 column in the WORK AREA. It

will be displayed in the OVER 90 DAYS column by the formula entered there.

Never enter values in coordinates containing formulas, or the formulas will be erased.

Column B must remain blank for this example.

	A	B	C	D	E	F	G	H	I	J
1	CUSTOMER		CURRENT	OVER 30	OVER 60	OVER 90	TOTAL		WORK	AREA
2	NAME		BILLING	DAYS	DAYS	DAYS	DUE		OLD 60	OLD 90
3	-----			-----					-----	
4	ACME CO.			45.00		0.00	45.00			
5	BELL CO.				25.00	45.00	70.00			45.00
6	KOLL CO.			56.58		0.00	56.58			
7	MAXEL CO.					89.00	89.00			89.00
8	REDDY CO.				35.00	0.00	35.00			
9	AJAX CO.		75.16			15.00	90.16			15.00
10	ZIPLOK		84.00			0.00	84.00			
11	MULTI-CR		3578.00			0.00	3578.00			
12	=====			=====						
13			3737.16	101.58	60.00	149.00	4047.74			

FIGURE 3

LEDGER UPDATING

To perform the updating process, you will transfer the values in column B (blank) and the CURRENT BILLING and OVER 30 DAYS columns into a disk storage file. You will then move the values in the OVER 60 DAYS and OVER 90 DAYS columns into a separate disk storage file. In the third step, you will reenter the values in column B (blank) and the CURRENT BILLING and OVER 30 DAYS columns repositioned one column to the right. This moves each of the values to the right, into its new ageing column, and clears the CURRENT BILLING column.

The final step in the updating process reenters the values from the OVER 60 DAYS and OVER 90 DAYS columns into the WORK AREA columns OLD 60 and OLD 90. The formula in the OVER 90 DAYS column adds the sums on each row of these two columns and displays the results in the OVER 90 DAYS column as cumulative totals for each customer listed.

Place your cursor on B4 (the upper-left coordinate of the rectangular ledger sheet area you wish to copy into the stored file)

Type:

/S	(start STORAGE command)
#	(tells the command to store the values within the rows and columns)
S	(tells the command to store the file)
SIXTYDAY	(file name; do not leave spaces between words)
RETURN	(actuate-save file name)
D11	(lower-right coordinate of the rectangle of value entries to be stored)
RETURN	(actuate-save values within the ledger sheet area indicated by coordinates)
C	(save the values in column form; executes the command)

Place your cursor on E4 (the upper-left coordinate of the rectangular ledger sheet area you wish to copy into the stored file)

Type:

/S	(start STORAGE command)
#	(tells the command to store the values within the rows and columns)
S	(tells the command to store the file)
NINTYDAY	(file name; do not leave spaces between words)
RETURN	(actuate-save file name)
F11	(lower-right coordinate of the rectangle of value entries to be stored)
RETURN	(actuate-save values within the ledger sheet area indicated by coordinates)
C	(save the values in column form; executes the command)

The third step in the updating operation reenters the values from the SIXTYDAY file on the ledger sheet one column to the right.

Place your cursor on C4 (the upper-left coordinate of the rectangular ledger sheet area where you wish the values to be reentered)

Type:

/S	(start STORAGE command)
#	(tells the command to reenter the values as stored)
L	(tells the command to load the file)
SIXTYDAY	(name of file to load)
RETURN	(actuate-prepare to load file)
C	(load the values in column form; executes the command)

The final operation enters the values from the NINTYDAY file into the WORK AREA columns.

Place your cursor on I4 (the upper-left coordinate of the rectangular ledger sheet area where you wish the values to be reentered)

Type:

/S	(start STORAGE command)
#	(tells the command to reenter the values as stored)
L	(tells the command to load the file)
NINTYDAY	(name of file to load)
RETURN	(actuate-prepare to load file)
C	(load the values in column form; executes the command)

You have now completed your monthly update of existing entries. Your ledger should now look like figure 4. You are ready to enter the transactions that have accumulated during the month just passed.

	A	B	C	D	E	F	G	H	I	J
1	CUSTOMER		CURRENT	OVER 30	OVER 60	OVER 90	TOTAL		WORK	AREA
2	NAME		BILLING	DAYS	DAYS	DAYS	DUE		OLD 60	OLD 90
3	-----									-----
4	ACME CO.				45.00	0.00	45.00			0.00
5	BELL CO.					70.00	70.00		25.00	45.00
6	KOLL CO.				56.58	0.00	56.58			0.00
7	MAXEL CO.					89.00	89.00			89.00
8	REDDY CO.					35.00	35.00		35.00	0.00
9	AJAX CO.			75.16		15.00	90.16			15.00
10	ZIPLOK			84.00		0.00	84.00			0.00
11	MULTI-CR			3578.00		0.00	3578.00			0.00
12	=====									
13			0.00	3737.16	101.58	209.00	4047.74			

FIGURE 4

MAKING MONTHLY ENTRIES

Monthly ledger entries will take one of two forms: payments and current billings.

To make current billing entries, type them directly into the CURRENT BILLINGS column.

To make a payment entry into the OVER 30 DAYS or the OVER 60 DAYS columns, place your cursor on the value you wish to deduct from and type:

(prepare to change value)
- (subtract)

Type in payment value.

RETURN (actuate-enters the resulting value)

To make a payment entry into the OVER 90 DAYS column, place your cursor on the adjacent row in the WORK AREA column containing a value and type:

(prepare to change value)
- (subtract)

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE command.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

```
/I          (start insert command)
R          (insert row; actuates
           command)
```

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

```
/S          (start STORAGE command)
S          (save)
FILENAME    (name of file; do not
           type spaces between
           words)
RETURN     (actuate command)
```

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle you wish to print and type:

```
/P          (start PRINT command)
P          (printer)
```

Type in the lower-right coordinate of the worksheet area rectangle you wish to print and press:

```
RETURN     (actuate command)
```


EXERCISE 2

DESCRIPTION

This exercise illustrates the ability of VisiCalc to select values from reference tables and to use those values in problem solving. The exercise also illustrates the calculation of a value from pre-determined limits on a graduated scale, and changing a value within a set to include application of discount, sales tax, or some other modifying factor.

A customer invoicing operation is used to demonstrate the abilities described above. Inventory numerical identification, description, and quantity are entered on lines in the invoice. The invoice format then automatically calculates the single price for each item and the total for the quantity ordered, adds the invoice total, applies a discount and sales tax factor and displays a grand total. A sales commission is calculated from the invoice net value and displayed in a salesperson commission report.

Operations Used

1. Setting Up The Format
2. Entering Mathematical Formulas
3. Making Additional Entries
4. Saving
5. Printing

Functions Used

LOOKUP
MIN
MAX
SUM

Commands Used

REPEAT LABEL	
GLOBAL	(C = column width
GLOBAL	(O = order of calculation)
FORMAT	(R = right justify)
FORMAT	(\$ = dollars and cents)
STORAGE	(S = save, and L = load)
REPLICATE	(copy)
INSERT	(R = row)
PRINT	

SETTING UP THE FORMAT

To set up your beginning format, copy figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

The Visicalc worksheet format contains columns nine spaces wide when it is first entered into the computer. Column width may be expanded using the following commands. In this exercise, you will use columns with 14 spaces.

To add spaces to your columns, type:

/G	(GLOBAL command)
C	(columns)
14	(the number of spaces per column)
RETURN	(actuate the command)

The Visicalc worksheet format normally calculates values in a column-by-column sequence, starting in the left-most column and continuing to the right. In this exercise, a number of formulas require row-by-row calculation to be in proper sequence. The Visicalc worksheet may be changed to a top-to-bottom row-by-row calculating sequence with a format change.

To change the order of calculation, type:

/G	(GLOBAL command)
O	(order of calculation)
R	(calculate by row)

To enter your column headings, place your cursor where you wish to make the entry and type:

/F	(start the FORMAT command)
R	(justify right)

Type in your column title.

Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines, place your cursor in the left-most column of the row where you want the line (line All in this example).

	A	B	C	D	E	F	G	H
1	INVOICE NUMBER							
2								
3	CUSTOMER NAME							
4	ADDRESS :							
5	CITY :							
6	STATE : ZIP CODE:							
7								
8	SALESPERSON NO DATE :							
9								
10	QUANTITY	ITEM NO.	DESCRIPTION	UNIT COST	TOTAL COST			
11	-----							
12								
13								
14								
15								
16								
17								
18								
19								
20	=====							
21	FREIGHT :							
22	SUB TOTAL :							
23	DISCOUNT :							
24	NET :							
25	5.4 SALES TAX :							
26	=====							
27	GRAND TOTAL :							
28								
29	SALES PERSON COMMISSION RPT.							
30	-----							
31	SALESPERSON NO							
32	INVOICE NUMBER							
33	COMMISSION :							
34								
35	-----							
36	PRICING TABLE		PRICING TABLE		DISCOUNT TABLE			
37	FOR PAPER PRO.	PRICE	FOR GLASS WARE	PRICE	AMOUNT	PERCENT		
38	-----		-----		-----			
39	0	0	0	0	0	0		
40	100	.55	200	.36	100	10		
41	125	.25	225	.59	200	12		
42	128	1.33	226	1.23	300	15		
43	129	.63	230	.89	500	18		
44	130	.75	255	3.25				
45	131	1.58	275	1.45				
46	132	2.36	276	.65				
47	133	0	280	0				

FIGURE 1.

Type:

/-	(start REPEAT LABEL command)
-	(label to be repeated)
RETURN	(actuates the command)

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, type:

/R	(start the REPLICATE command)
RETURN	(tells the command to copy the dashed line your cursor is on)
B11	(the first coordinate in which you wish the dashed line to be extended from)
.	(elipsis ... indicating from-to)
E11	(the last coordinate in the row the dashed line is to be extended to)
RETURN	(actuates the command)

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on your invoice, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their locations are illustrated in figure 2.

The first formula will search two reference tables for the inventory number (ITEM NO.) listed on the invoice, pick up the price listed in the table to the right of that number and enter it in the UNIT COST column on the invoice. The tables in this exercise have been purposely set up to demonstrate multiple-table search capability. Because of the unique features contained in this operation, an extensive description of the logic has been provided.

The LOOKUP function is used to control selection of the appropriate table and to locate the desired value in the selected table. Two LOOKUP functions are used in this example, to search for the desired value in each of two tables.

When a LOOKUP function fails to detect a value as large as that it has been asked to search for, it will select the largest value in the table and enter the number to the right of it into

	A	B	C	D	E	F	G	H
1	INVOICE NUMBER							
2								
3	CUSTOMER NAME							
4	ADDRESS :							
5	CITY :							
6	STATE : ZIP CODE:							
7								
8	SALESPERSON NO		DATE :		=MAX(LOOKUP(B12,A39...A47),LOOKUP(B12,D39...D47))			
9								
10	QUANTITY	ITEM NO.	DESCRIPTION	UNIT COST	TOTAL COST			
11	-----							
12				0	0.00	=A12*D12		
13				0	0.00			
14				0	0.00			
15				0	0.00			
16				0	0.00			
17				0	0.00			
18				0	0.00			
19				0	0.00			
20	=====							
21	=LOOKUP(SUM(E11...E20),G39...G43)			FREIGHT :	0.00			
22				SUB TOTAL :	0.00	=SUM(E11...E21)		
23	0			DISCOUNT :	0.00	=-SUM(E11...E20)*C23/100		
24				NET :	0.00	=SUM(E22,E23)		
25	5.4			SALES TAX :	0.00	=E24*C25/100		
26	=====							
27				GRAND TOTAL :	0.00	=SUM(E24,E25)		
28								
29	SALES PERSON COMMISSION RPT.							
30	-----							
31	SALESPERSON NO	0	=B8					
32	INVOICE NUMBER	0	=B1					
33	COMMISSION :	0.00	=(MIN(E24,100)*.1)+(MAX(0,MIN(E24-100,200))*12)+(MAX(0,E24-300)*.15)					
34								
35	-----							
36	PRICING TABLE		PRICING TABLE		DISCOUNT TABLE			
37	FOR PAPER PRO.	PRICE	FOR GLASS WARE	PRICE	AMOUNT		PERCENT	
38	-----							
39	0	0	0	0	0	0		
40	100	.55	200	.36	100	10		
41	125	.25	225	.59	200	12		
42	128	1.33	226	1.23	300	15		
43	129	.63	230	.89	500	18		
44	130	.75	255	3.25				
45	131	1.58	275	1.45				
46	132	2.36	276	.65				
47	133	0	280	.35				

FIGURE 2.

the formula. To accomodate the LOOKUP search from the end of one column to the beginning of the next, zero has been listed to the right of the last number in each column. If the LOOKUP number is larger than the last number in a column, it will pickup and enter the value opposite the last number in the formula.

If the LOOKUP value is smaller than the first whole number in a table, it will display ERROR. In this exercise, zero has been listed in the first position of each table to enable the LOOKUP function to pickup and use the number to the right of that first listing when the first whole number is less than the LOOKUP number. The value 0 is listed to the right of these first position entries to supply that value to the formula.

In the table containing the LOOKUP value, the LOOKUP function will pickup and enter the number to the right of that value into the formula. In the table not containing the LOOKUP value, the LOOKUP function will pickup and list zero into the formula. The formula is constructed to select the largest value selected by the LOOKUP functions contained within it.

Place your cursor on D12 and type:

@MAX(	(Select the maximum value
	in list to follow)
@LOOKUP(	(start LOOKUP function)
B12,	(coordinate containing
	value to lookup)
A39	(first coordinate of the
	reference table)
.	(elipsis ... indicating
	from-to)
A47)	(last coordinate in
	reference table)
,	(comma-separates values
	in list)
@LOOKUP(	(start LOOKUP function)
B12,	(coordinate containing
	value to lookup)
D39	(first coordinate of the
	reference table)
.	(elipsis ... indicating
	from-to)
D47))	(last coordinate in
	reference table)
RETURN	(actuate-enters the formula
	in D12)
/F	(start FORMAT command)
\$	(display in dollars and
	cents format)

The second formula multiplies the UNIT COST by QUANTITY and displays it in the TOTAL COST column in dollars and cents format.

Place your cursor on E12 and type:

+A12	(picks up value from QUANTITY column)
*	(multiply)
D12	(picks up value from UNIT COST column)
RETURN	(actuate-enters the formula in E12)
/F	(start FORMAT command)
\$	(display in dollars and cents format)

Your next operation is to copy the formulas just entered at the top of each column into each row in the respective columns.

Place your cursor on D12 and type:

/R	(start the REPLICATE command)
E12	(copy all entries across columns from D12 to E12)
RETURN	(actuate-prepare to receive additional instructions)
D13	(first coordinate where you wish to copy the formulas down columns)
.	(elipsis ... indicating from-to)
D19	(last coordinate where you wish to copy the formulas down columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
N	(tells the command to copy the coordinate address in the formula in its new location without change)
N	
R	
N	
N	
R	
R	

Your next formula will add the sum of the values in the TOTAL COST column above the double-dashed line and the FREIGHT value. The answer will be displayed as SUB TOTAL, in dollars and cents format.

Place your cursor on E22 and type:

@SUM(	(add)
E11	(first coordinate of the column you wish to add)
.	(elipsis ... indicating from-to)
E21)	(last coordinate of the column you wish to add)
RETURN	(actuate-enters the formula in E22)
/F	(starts FORMAT command)
\$	(display in dollars and cents format)

You will now enter a LOOKUP function that will use the sum of the TOTAL COST column to select an appropriate discount rate from the DISCOUNT TABLE (containing a graduated set of values) and display it to the left of DISCOUNT.

Place your cursor on C23 and type:

@LOOKUP(	(start LOOKUP function)
@SUM(	(add)
E11	(first coordinate of the column you wish to add)
.	(elipsis ... indicating from-to)
E20)	(last coordinate of the column you wish to add)
,	(comma-separates value to lookup from discount table coordinates)
G39	(first coordinate of the discount table)
.	(elipsis ... indicating from-to)
G43)	(last coordinate of the discount table)
RETURN	(actuate-enters the formula into C23)

The next formula will add the sum of the TOTAL COST column above the double-dashed line, multiply the result by the discount rate and divide the answer by 100 to arrive at a percentage value. The resulting discount allowance will be displayed on the DISCOUNT line in dollars and cents as a negative value.

Place your cursor on E23 and type:

-@SUM(	(add, and display the resulting value as a negative value)
E11	(first coordinate of the column you wish to add)
.	(elipsis ... indicates from-to)
E20)	(last coordinate of the column you wish to add)
*	(multiply)
C23	(coordinate of the value to be multiplied by)
/	(divide)
100	(divisor)
RETURN	(actuate-enters the formula into E23)
/F	(start FORMAT command)
\$	(display in dollars and cents format)

A simple SUM formula will now be entered to calculate the value of the SUB TOTAL less DISCOUNT. The result will be displayed on the NET line in dollars and cents format.

Place your cursor on E24 and type:

@SUM(	(add)
E22	(coordinate to add)
,	(comma-separates values in the list being added)
E23)	(coordinate to add)
RETURN	(actuate-enters formula in E24)
/F	(start FORMAT command)
\$	(display in dollars and cents format)

To determine sales tax on the net invoiced value, you must first enter the sales tax rate, then enter a formula that will multiply the NET value times that rate and divide the result by 100 to arrive at a percentage value. The tax amount will then be displayed on the SALES TAX line in dollars and cents format.

Place your cursor on C25 and type:

5.4	(sales tax rate used in the example)
RETURN	(actuate-enters the value in C25)

Place your cursor on E25 and type:

+E24	(coordinate of the value to be multiplied by the sales tax rate)
*	(multiply)
C25	(coordinate of the sales tax rate)
/	(divide)
100	(diviser)
RETURN	(actuate-enters formula into E25)
/F	(start FORMAT command)
\$	(display in dollars and cents format)

Now enter a formula to add the NET and the SALES TAX values.
The result will display on the GRAND TOTAL line in dollars and
cents format.

Place your cursor on E27 and type:

@SUM(	(add)
E24	(coordinate to add)
,	(comma-separates values in the list being added)
E25)	(coordinate to add)
RETURN	(actuate-enters formula in E27)
/F	(start FORMAT command)
\$	(display in dollars and cents format)

The final set of formulas will record the invoice and salesman's
numbers on the SALES PERSON COMMISSION RPT., and calculate the
salesperson's commission. The commission will be determined by
comparing the invoice NET value against a set of graduated
values, then multiplying the NET value by the appropriate
commission percentages. Commission rates used in this example
are: 10 percent on the first \$100, 12 percent on the next \$200,
and 15 percent on amounts over \$300. The commission amount will
be displayed on the COMMISSION line in dollars and cents format.

Place your cursor on B31 and type:

+B8	(enters the value in B8 in B31)
RETURN	(actuate-enters the formula in B31)

Place your cursor on B32 and type:

+B1	(enters the value in B1 in B32)
RETURN	(actuate-enters the formula in B32)

Place your cursor on B33 and type:

(@MIN(E24,100)	(select the minimum value, the value in E24 or 100)
*	(multiply)
.10)	(sales commission percentage)
+	(add)
(@MAX(0,@MIN(E24-100,200))	(select the maximum value from the comparison of 0 and the minimum value derived by comparing the value in E24 minus 100, and 200)
*	(multiply)
.12)	(sales commission percentage)
+	(add)
(@MAX(0,E24-300)	(select the maximum value, 0 or the value in E24 minus 300)
*	(multiply)
.15)	(sales commission percentage)
RETURN	(actuate-enter formula in B33)
/F	(start FORMAT command)
\$	(display in dollars and cents format)

Your Customer Invoice and Sales Commission Report format is now complete and ready for you to type in invoicing information and sales entries.

To observe the automatic functions of your invoice sheet, type entries into the QUANTITY and ITEM NO. columns. Some sample entries are contained in figure 3.

	A	B	C	D	E	F	G	H
1	INVOICE NUMBER	123589						
2								
3	CUSTOMER NAME ACME COMPANY							
4	ADDRESS :SW PINE ST							
5	CITY :PORTLAND							
6	STATE :OREGON		ZIP CODE:	97523				
7								
8	SALESPERSON NO	22	DATE :JULY 14,81					
9								
10	QUANTITY	ITEM NO.	DESCRIPTION	UNIT COST	TOTAL COST			
11								
12	12	225		.59	7.08			
13	125	132		2.36	295.00			
14	25	255		3.25	81.25			
15	36	125		.25	9.00			
16	48	129		.63	30.24			
17				0	0.00			
18				0	0.00			
19				0	0.00			
20	=====							
21			FREIGHT :		0.00			
22			SUB TOTAL :		422.57			
23			15 DISCOUNT :		-63.39			
24			NET :		359.18			
25			5.4 SALES TAX :		19.40			
26								
27			GRAND TOTAL :		378.58			
28								
29	SALES PERSON COMMISSION RPT.							
30								
31	SALESPERSON NO	22						
32	INVOICE NUMBER	123589						
33	COMMISSION :	42.88						
34								
35								
36	PRICING TABLE		PRICING TABLE			DISCOUNT TABLE		
37	FOR PAPER PRO.	PRICE	FOR GLASS WARE	PRICE		AMOUNT	PERCENT	
38								
39	0	0	0	0		0	0	
40	100	.55	200	.36		100	10	
41	125	.25	225	.59		200	12	
42	128	1.33	226	1.23		300	15	
43	129	.63	230	.89		500	18	
44	130	.75	255	3.25				
45	131	1.58	275	1.45				
46	132	2.36	276	.65				
47	133	0	280	0				

FIGURE 3.

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE command.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	(start insert command)
R	(insert row; actuates command)

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	(start STORAGE command)
S	(save)
FILENAME	(name of file; do not type spaces between words)
RETURN	(actuate command)

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle you wish to print and type:

/P	(start PRINT command)
P	(printer)

Type in the lower-right coordinate of the worksheet area rectangle you wish to print and press:

RETURN	(actuate command)
--------	-------------------

EXERCISE 3

DESCRIPTION

In this exercise, you will use the VisiCalc ability to select the minimum or maximum of values when compared to a fixed value. The exercise is designed to record a declining balance as entries accumulate against the fixed value. An increasing positive balance is recorded when the fixed value is surpassed.

To demonstrate these abilities, a ledger sheet format has been set up listing the equipment stocked by an equipment rental company. Each piece of equipment offered for rent has been listed, and the purchase price entered in the ledger. As the company receives rental income from the equipment, the cumulative amount is entered on the ledger sheet once a month. Your ledger format deducts the rental income from the purchase price of the item rented and displays the declining balance until the full cost is recovered. It then enters the above-cost profits as they accumulate. Once a month, an operation is performed to advance the ageing record of the equipment listed, providing a record of how long each piece of equipment has been in service, and to update the ledger.

Operations Used

1. Setting Up The Format
2. Entering Mathematical Formulas
3. Making Ledger Entries
4. Ledger Updating
5. Making Additional Entries
6. Saving
7. Printing

Functions Used.

MAX
ABS
MIN
SUM
!

(recalculate total ledger)

Commands Used.

REPEATING LABEL	
FORMAT	(R = right justify)
GLOBAL	(\$ = dollars and cents format)
STORAGE	(#)
REPLICATE	(copy)
INSERT	(R = row)
BLANK	(delete entry)

SETTING UP THE FORMAT

To set up your ledger sheet, copy figure 1 exactly as it is illustrated retaining exact row and column locations of all information.

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT		WORK AREA			
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN		BALANCE	SERVICE	MARGIN	
3	-----							-----			
4											
5											
6											
7											
8											
9											
10											
11		=====									
12											

FIGURE 1.

To format all locations to display value entries in dollars and cents, type:

```
/G      (start global command)
F       (format)
$       (dollars and cents)
```

To enter your column headings, place your cursor where you wish to make the entry and type:

```
/F      (start the FORMAT command)
R       (justify right)
```

Type in your column title.
Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your ledger sheet, place your cursor in the left-most column of the row where you want the line (A3 in this example).

Type:

```
/-      (start REPEAT LABEL command)
-       (label to be repeated)
RETURN  (actuates the command)
```

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, leave your cursor where it is, and type:

```
/R      (start the REPLICATE command)
RETURN  (tells the command to copy the
        dashed line your cursor is on)
B3      (the first coordinate in which you
        wish the dashed line to be extended
        from)
.       (elipsis ... indicating from-to)
K3      (the last coordinate in the row you
        wish the dashed line to be extended
        to)
RETURN  (actuates the command)
```

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the ledger sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their locations are illustrated in figure 2.

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT			WORK AREA		
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN			BALANCE	SERVICE	MARGIN
3											
4		$\text{@MAX}(0, H4)$		0.00	1	0.00		0.00	0.00	0.00	
5				0.00	1	0.00		0.00	0.00	0.00	
6				0.00	1	0.00		0.00	0.00	0.00	
7				0.00	1	0.00		0.00	0.00	0.00	
8				0.00	1	0.00		0.00	0.00	0.00	
9				0.00	1	0.00		0.00	0.00	0.00	
10				0.00	1	0.00		0.00	0.00	0.00	
11											
12		0.00	0.00	0.00		0.00			$+I4-C4$	$+B4$	
		$\text{@SUM}(B3...B11)$			$1+J4$			$\text{@ABS}(\text{@MIN}(0, H4))+K4$			

FIGURE 2.

The first formula will provide a means for the INVEST BALANCE column to display the unrecovered purchase cost of each item listed. When the full purchase cost of each piece of equipment is recovered, the INVEST BALANCE column will display 0.00 opposite that item.

Place your cursor on D4 and type:

$\text{@MAX}(0, H4)$	(select the maximum value, 0, or the value in H4)
RETURN	(actuate-enters the formula in D4)

The second formula advances the number in the MTHS IN SERVICE column by one each time the updating operation is performed.

Place your cursor in E4 and type:

$1+J4$	(add 1 to the value in J4)
RETURN	(actuate-enters the formula in E4)
/F	(start FORMAT command)
I	(display the value as an integer)

The next formula displays accumulated gross profits in the PROFIT MARGIN column when purchase cost of the listed item has been recovered.

Place your cursor in F4 and type:

@ABS	(read the answer to the following calculation as a positive value)
(@MIN(0,H4))	(select the minimum value, 0, or the value in H4)
+K4	(add the value in K4 to the answer to the preceding calculation)
RETURN	(actuate-enters the formula in F4)

Formula four performs a rental income deduction function in the WORK AREA columns.

Place your cursor in H4 and type:

+I4-C4	(subtract the value in I4 from the value in C4)
RETURN	(actuate-enters the formula in H4)

The fifth formula displays the original purchase price in a WORK AREA column.

Place your cursor in I4 and type:

+B4	(enters the value in B4 in I4)
RETURN	(actuate-enters the formula in I4)

Your next operation is to copy the formulas just entered at the top of each column into each row in the respective columns.

Place your cursor on D4 and type:

/R	(start the REPLICATE command)
I4	(copy all entries across columns D4 to I4)
RETURN	(actuate-prepare to receive additional instructions)
D5	(first coordinate where you wish to copy the formulas down columns)

.	(elipsis ... indicating from-to)
D10	(last coordinate where you wish to copy the formulas down columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
R	
R	
R	
R	
R	

To display the sum of the entries in each column, it is necessary to enter a formula at the bottom that will add the values.

Place your cursor on B12 and type:

@SUM(	(add)
B3	(first coordinate of the column you wish to add)
.	(elipsis ... indicates from-to)
B11)	(last coordinate of the column you wish to add)
RETURN	(actuate-enters the formula in B12)

Your next operation is to copy the formula just entered at the bottom of each column you wish to add.

Leave your cursor on B12 and type:

/R	(start the REPLICATE command)
RETURN	(actuate-tells the command to copy the formula in B12)
C12	(first coordinate where you wish to copy the formula across columns)
.	(elipsis ... indicating from-to)
F12	(last coordinate where you wish to copy the formula across columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
R	

You won't need the SUM formula at the bottom of the MTHS IN SERVICE column, so place your cursor on E12 and type:

/B	(BLANK command-delete entry)
RETURN	(actuate the command)

MAKING LEDGER ENTRIES

Your Cost Recovery Ledger is now set up so once a month, all you have to do is perform the update process, described in the next section, and make current billing entries. To get your ledger operational, type in the entries in the ITEM NAME, PURCHASE PRICE and RENT REC'D columns in figure 3 exactly as they are shown.

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT		WORK AREA			
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN		BALANCE	SERVICE	MARGIN	
3	-----										
4	HAMMER	25.00	5.00	20.00	1	0.00		20.00	25.00		
5	TRAILER	675.00	155.00	520.00	1	0.00		520.00	675.00		
6	SHOVEL	55.00	89.00	0.00	1	34.00		-34.00	55.00		
7	BIKE	255.00	15.55	239.45	1	0.00		239.45	255.00		
8	TRUCK	6500.00	250.00	6250.00	1	0.00		6250.00	6500.00		
9	MOTOR	152.00	225.00	0.00	1	73.00		-73.00	152.00		
10	AX	89.00	18.00	71.00	1	0.00		71.00	89.00		
11	=====										
12		7751.00	757.55	7100.45		107.00					

FIGURE 3.

LEDGER UPDATING

The first operation in the updating process is to transfer the values in the INVEST BALANCE, MTHS IN SERVICE and PROFIT MARGIN columns into a storage file on a disk. The values will be filed under the name MO.TOTALS. You will then recall the file and reenter the values into WORK AREA columns I, J and K.

Place your cursor on D4 (the upper-left coordinate of the rectangular area of your ledger sheet you wish to copy into the storage file).

Type:

/S	(start STORAGE command)
#	(tells the command to store the values within the rows and columns)
S	(tells the command to save the file)
MO.TOTALS	(file name; do not leave spaces between words)
RETURN	(actuate-save file name)
F10	(lower-right coordinate of the rectangle of value entries to be stored)
RETURN	(actuate-save values within the ledger sheet area indicated by coordinates)
C	(save the values in column form; executes the command)

Your next operation will be to recall the stored MO.TOTAL file and position reenter the values in WORK AREA columns I, J and K.

Place your cursor on I4 (the upper-left coordinate of the ledger sheet area where you wish to reenter the stored values).

Type:

/S	(start STORAGE command)
#	(tells the command to reenter the values within the rows and columns)
L	(tells the command to load the file)
MO.TOTALS	(name of file to load)
RETURN	(actuate-prepare to load file)
C	(reenter the values in column form; executes the command)

Now clear the RENT REC'D column.

Place your cursor on C4 and type:

/B	(start BLANK command)
RETURN	(actuate-clears the entry)

Next, copy the blank in C4 down the remainder of the RENT REC'D column.

Type:

```

/R          (start REPLICATE command)
RETURN     (tells the command to copy
           the blank your cursor is
           on)
C5         (first coordinate
           where you wish to copy the
           the blank down the column)
.         (elipsis ... indicating
           from-to)
C10        (last coordinate where you
           wish to copy the blank
           down the column)
RETURN     (actuates the command)

```

Your ledger sheet should now look exactly like figure 4.

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT		WORK AREA			
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN		BALANCE	SERVICE	MARGIN	
3	-----										
4	HAMMER	25.00		20.00	2	0.00		20.00	20.00	1.00	0.00
5	TRAILER	675.00		320.00	2	0.00		520.00	520.00	1.00	0.00
6	SHOVEL	55.00		0.00	2	54.00		0.00	0.00	1.00	34.00
7	BIKE	255.00		239.45	2	0.00		239.45	239.45	1.00	0.00
8	TRUCK	6500.00		3750.00	2	0.00		6250.00	6250.00	1.00	0.00
9	MOTOR	152.00		0.00	2	98.00		0.00	0.00	1.00	73.00
10	AX	89.00		26.00	2	0.00		71.00	71.00	1.00	0.00
11	=====										
12		7751.00	0.00	4355.45		152.00					

FIGURE 4.

Your ledger is now ready for entry of the rental incomes for the preceeding month. Type the entries in figure 5 into the appropriate spaces in the RENT REC'D column.

When you have completed your RENT REC'D entries, type:

```

!          (recalculate all formulas)
!

```

	A	B	C	D	E	F	G	H	I	J	K
1	ITEM	PURCHASE	RENT	INVEST	MTHS IN	PROFIT		WORK AREA			
2	NAME	PRICE	REC'D	BALANCE	SERVICE	MARGIN		BALANCE	SERVICE	MARGIN	
3	-----										
4	HAMMER	25.00	35.00	0.00	2	15.00		-15.00	20.00	1.00	0.00
5	TRAILER	675.00	200.00	320.00	2	0.00		320.00	520.00	1.00	0.00
6	SHOVEL	55.00	20.00	0.00	2	54.00		-20.00	0.00	1.00	34.00
7	BIKE	255.00		239.45	2	0.00		239.45	239.45	1.00	0.00
8	TRUCK	6500.00	2500.00	3750.00	2	0.00		3750.00	6250.00	1.00	0.00
9	MOTOR	152.00	25.00	0.00	2	98.00		-25.00	0.00	1.00	73.00
10	AX	89.00	45.00	26.00	2	0.00		26.00	71.00	1.00	0.00
11	=====										
12		7751.00	2825.00	4335.45		167.00					

FIGURE 5.

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE command.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

```
/I          (start insert command)
R          (insert row; actuates
           command)
```

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

```
/S          (start STORAGE command)
S          (save)
FILENAME    (name of file; do not
           type spaces between
           words)
RETURN     (actuate command)
```

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle you wish to print and type:

```
/P          (start PRINT command)
P          (printer)
```

Type in the lower-right coordinate of the worksheet area rectangle you wish to print and press:

```
RETURN     (actuate command)
```


EXERCISE 4

DESCRIPTION

You will use the ability of VisiCalc to calculate a value from a variable number base in this exercise. Movement of entire rows containing label and value entries, and recalculation of values as a result of those moves are demonstrated, and VisiCalc's split window capability will be used to observe two sections of the work sheet at the same time. Changing the standard calculation sequence of the worksheet is also illustrated in this exercise.

A production scheduling sheet for a stained glass lamp manufacturer has been set up to utilize the features described. Three weeks of plant production time are illustrated. The total number of shop hours available per week is entered, and this number is measured against the estimated hours required to complete customer work orders.

The scheduling sheet totals the number of shop hours in each department, calculates the remaining hours to maximum shop capacity and the percentage measurement of those remaining hours. A plant production summary displays the hourly totals for each week in the schedule, and the grand totals for the combined period.

Customer orders may be repositioned on the scheduling sheet from one week to another for planning or rescheduling purposes. The scheduling sheet will recalculate all values relative to the repositioning. With the entry of the month and the date of the first Monday of the scheduled week, the correct month and date will automatically be entered for the remaining sequential weeks.

Operations Used

1. Setting Up The Format
2. Entering Mathematical Formulas
3. Making Scheduling Sheet Entries
4. Rescheduling Entries
5. Making Additional Entries
6. Saving
7. Printing

Functions Used.

AVERAGE
LOOKUP
INT (Integer)
SUM
MIN

Commands Used.

REPEATING LABEL
FORMAT (I = display integer value)
REPLICATE (copy)
INSERT (R = row)
MOVE (R = row)
GLOBAL (O = order of calculation)
WINDOW

SETTING UP THE FORMAT

To set up your production scheduling sheet, copy figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

The Visicalc worksheet format normally calculates values in a column-by-column sequence, starting in the left-most column and continuing to the right. In this exercise, a number of formulas require row-by-row calculation to be in proper sequence. The Visicalc worksheet may be changed to a top-to-bottom row-by-row calculating sequence with a format change.

To change the order in which the worksheet will be calculated, type:

/G (start GLOBAL command)
O (order of calculation)
R (calculate by row)

To enter your column headings, type:

/F (start the FORMAT command)
R (justify right)

Type in your column title.

Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

	A	B	C	D	E	F	G	H	I	J	K	L
1	MAX NUMBER OF SHOP HOURS IN A WEEK = 200											
2	-----											
3	MONTH		MONDAYS DATE				DAYS/MTH.					
4	-----											
5			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
6	JOB NO	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
7	-----											
8												
9												
10												
11	=====											
12	TOTALS											
13	-----											
14	MONTH		MONDAYS DATE				DAYS/MTH.					
15	-----											
16			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
17	JOB NO	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
18	-----											
19												
20												
21												
22	=====											
23	TOTALS											
24	-----											
25	MONTH		MONDAYS DATE				DAYS/MTH.					
26	-----											
27			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
28	JOB NO.	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
29	-----											
30												
31												
32												
33	=====											
34	TOTALS											
35	-----											
36	PLANT PRODUCTION SUMMARY											
37	-----											
38		MONDAYS	PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.			
39	MONTH	DATE	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS			
40	-----											
41												
42												
43												
44	=====											
45	TOTALS											
46	-----											
47												
48	DAYS IN THE MONTH TABLE											
49	-----											
50	1	2	3	4	5	6	7	8	9	10	11	12
51	31	28	31	30	30	30	31	31	30	31	30	31
52	-----											
53	TABLE "A"			TABLE "B"			TABLE "C"					
54	-----			-----			-----					
55	.001	1	1.001	.001	1.001		0	13				
56	0	1	0	0	1		13	1				
57	-----			-----			-----					

FIGURE 1.

To enter dashed lines on your ledger sheet, place your cursor in the left-most column of the row where you want the line (A3 in this example).

Type:

```
/-      (start REPEAT LABEL command)
-       (label to be repeated)
RETURN  (actuates the command)
```

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns, type:

```
/R      (start the REPLICATE command)
RETURN  (tells the command to copy the
         dashed line your cursor is on)
B2      (the first coordinate in which you
         wish the dashed line to be extended
         from)
.       (elipsis ... indicating from-to)
I2      (the last coordinate in the row you
         wish the dashed line to be extended
         to)
RETURN  (actuates the command)
```

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the ledger sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their positions are illustrated in figure 2.

Your first formula will total the estimated hours from the PATTERN MAKING, CUT GLASS, ASSEMBLE and SHIP columns in the EST. HOURS column.

Place your cursor on G8 and type:

```
@SUM(      (add)
C8          (first coordinate of
            the column you wish to
            add)
.          (elipsis ... indicates
            from-to)
```

A	B	C	D	E	F	G	H	I	J	K	L
1	MAX NUMBER OF SHOP HOURS IN A WEEK = 200										
2											
3	MONTH	MONDAY'S DATE				DAYS/MTH		30	=LOOKUP(B3,A50...L50)		
4											
5	JOB NO	CUSTOMER	PATTERN MAKING	CUT GLASS	ASSEMBLE	SHIP	EST. HOURS	PCT OF MAX HRS	HRS VS. MAX HRS		
6											
7											
8	=SUM(C8...F8)						0	0	=68/E1*100		
9							0	0			
10	=SUM(C7...C11)						0	0			
11											
12	TOTALS		0	0	0	0	0	0	-200	=612-E1	
13	=MIN(B3+LOOKUP(F3+7/I3,E55...F55),LOOKUP(B3+LOOKUP(F3+7/I3,E55...F55),H55...I55))										
14	MONTH	0					7	DAYS/MTH		30	(((F3+7/I3)+LOOKUP(F3+7/I3,A55...C55))-INT(F3+7/I3))*I3
15											
16	JOB NO	CUSTOMER	PATTERN MAKING	CUT GLASS	ASSEMBLE	SHIP	EST. HOURS	PCT OF MAX HRS	HRS VS. MAX HRS		
17											
18											
19							0	0			
20							0	0			
21							0	0			
22											
23	TOTALS		0	0	0	0	0	0	-200		
24											
25	MONTH	0	MONDAY'S DATE				14	DAYS/MTH		30	
26											
27	JOB NO.	CUSTOMER	PATTERN MAKING	CUT GLASS	ASSEMBLE	SHIP	EST. HOURS	PCT OF MAX HRS	HRS VS. MAX HRS		
28											
29											
30							0	0			
31							0	0			
32							0	0			
33											
34	TOTALS		0	0	0	0	0	0	-200		
35											
36	PLANT PRODUCTION SUMMARY										
37											
38	MONDAYS	PATTERN	CUT	ASSEMBLE	SHIP	EST.	PCT OF	HRS VS.			
39	MONTH	DATE	MAKING	GLASS	BLE	HOURS	MAX HRS	MAX HRS			
40											
41	=B3	=F3	=C12	0	0	0	0	0	-200		
42	=B14	=F14	=C23	0	0	0	0	0	-200		
43	=B25	=F25	=C34	0	0	0	0	0	-200		
44											
45	TOTALS		0	0	0	0	0	0	-600	=AVERAGE(H40...H44)	
46	=SUM(C40...C44)										
47											
48	DAYS IN THE MONTH TABLE										
49											
50	0	2	3	4	5	6	7	8	9	10	11
51	31	28	31	30	30	30	31	31	30	31	30
52											
53	TABLE "A"			TABLE "B"			TABLE "C"				
54											
55	.001	1	1.001	.001	1.001		0	13			
56	0	1	0	0	1		13	1			
57											

FIGURE 2.

F8)	(last coordinate of the column you wish to add)
RETURN	(actuate-enters the formula in G8)

To calculate the percent each work order represents of the maximum hours available in the week, the next formula divides the EST. HOURS column total for individual work orders by the maximum hours available. The result is multiplied by 100 to display the percentage value as a whole number.

Place your cursor on H8 and type:

+	(prepares the coordinate to accept a numeric expression)
G8	(coordinate to be divided)
/	(divide)
E1	(diviser)
*	(multiply)
100	(multiplier)
RETURN	(actuate-enters the formula in H8)
/F	(start FORMAT command)
I	(INTEGER-display value as a whole number)

Your next operation is to copy the formulas just entered into the remaining rows in their respective columns down to the dashed line.

Put your cursor on G8 and type:

/R	(start the REPLICATE command)
H8	(copy all entries across columns G8 to H8)
RETURN	(actuate-prepare to receive additional instructions)
G9	(first coordinate where you wish to copy the formula down columns)
.	(elipsis ... indicating from-to)
G10	(last coordinate where you wish to copy the formula down columns)
RETURN	(actuate the command)

R	(tells the command to
R	copy the coordinate
R	address in the formula
	relative to its new
N	location)

Now copy the formulas for the EST. HOURS and PCT OF MAX HOURS columns into the same columns in the following sequential weeks, one at a time.

Leave your cursor on G8 and type:

/R	(start the REPLICATE command)
H8	(copy all entries across columns G8 to H8)
RETURN	(actuate-prepare to receive additional instructions)
G19	(first coordinate where you wish to copy the formula down columns)
.	(elipsis ... indicates from-to)
G21	(last coordinate where you wish to copy the formula down columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate
R	address in the formula
R	relative to its new location)
N	(tells the command to copy the coordinate address in the formula in its new location without change)

To copy the formulas into the columns in the following sequential week, leave your cursor on G8 and type:

/R	(start the REPLICATE command)
H8	(copy all entries across columns G8 to H8)
RETURN	(actuate-prepare to receive additional instructions)
G30	(first coordinate where you wish to copy the formula down columns)
.	(elipsis ... indicates from-to)

G32	(last coordinate where you wish to copy the formula down columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
N	(tells the command to copy the coordinate address in the formula in its new location without change)

The next formula will add the total of values in the PATTERN MAKING column.

Place your cursor on C12 and type:

@SUM(	(add)
C7	(first coordinate of the column you wish to add)
.	(elipsis ... indicates from-to)
C11	(last coordinate of the column you wish to add)
RETURN	(actuate-enters the formula in C12)

Your next operation is to copy the formulas just entered at the bottom of each column you wish to add.

Leave your cursor on C12 and type:

/R	(start the REPLICATE command)
RETURN	(actuate-tells the command to copy the formula in C12)
D12	(first coordinate where you wish to copy the formula across columns)
.	(elipsis ... indicating from-to)
H12	(last coordinate where you wish to copy the formula across columns)
RETURN	(actuate the command)

R	(tells the command to
	copy the coordinate
	address in the formula
R	relative to its new
	location)

The next formula will compare the total estimated hours against the maximum shop hours available and display the difference at the bottom of the HRS VS. MAX HRS column. A negative value indicates hours remaining; a positive value hours exceeded.

Place your cursor on I12 and type:

+	(prepares the
	coordinate to accept
	a numeric expression)
G12	(coordinate to subtract
	from)
-	(subtract)
E1	(subtractor)
RETURN	(actuate-enters the
	formula in I12)

Your next operation is to copy the formulas just entered on the first week's TOTALS line into the TOTALS line of the next sequential week.

Put your cursor on C12 and type:

/R	(start the REPLICATE
	command)
I12	(copy all entries across
	columns C12 to I12)
RETURN	(actuate-prepare to
	receive additional
	instructions)
C23	(first coordinate where
	you wish to copy the
	formula across columns)
RETURN	(actuate the command)
R	(tells the command to
R	copy the coordinate
R	address in the formula
R	relative to its new to
R	location)
R	
R	
R	
R	
R	
R	(N, tells the command to
R	copy the coordinate
	address in the formula
R	in its new location
N	without change)

Now, copy the formulas into the TOTALS line of the following sequential week or weeks, one at a time.

Leave your cursor on C12 and type:

/R	(start the REPLICATE command)
I12	(copy all entries across columns C12 to I12)
RETURN	(actuate-prepare to receive additional instructions)
C34	(first coordinate where you wish to copy the formula across columns)
RETURN	(actuate the command)
R	(tells the command to copy the formula
R	coordinate address in
R	the formula relative to
R	its new location)
R	
R	
R	
R	
R	
R	(N, tells the command to
R	copy the coordinate
R	address in the formula
	in its new location
N	without change)

You will now enter a series of formulas into the production schedule to automatically advance the DAYS/MTH, MONTH and MONDAYS DATE entries in subsequent weeks after manually entering the MONTH and MONDAYS DATE in the first week. The DAYS/MTH entry for the first week will also calculate automatically following these two manual entries.

The DAYS/MTH entry will be obtained using the LOOKUP function and comparing the MONTH entry of that week to the DAYS IN THE MONTH TABLE to select and display the correct number of days for that month.

Place your cursor on I3 and type:

@LOOKUP(	(starts the LOOKUP function)
B3	(coordinate containing value to be looked up)
,	(comma separates value to be looked up from table coordinates)
A50	(first coordinate of reference table)

.	(elipsis ... indicating from-to)
L50)	(last coordinate of reference table)
RETURN	(activate-enters the formula into coordinate I3)

Now, copy the formula just entered into the DAYS/MTH entry position for the next sequential week.

Leave your cursor on I3 and type:

/R	(start the REPLICATE command)
RETURN	(tells the command to copy the formula in the coordinate your cursor is on)
I14	(coorindate to copy into)
RETURN	(actuates the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
N	(tells the command to copy the coordinate address in the formula in its new location without change)
N	

You may copy the DAYS/MTH formula into the final sequential week with the commands above, leaving your cursor on I3 and changing the coordinate to copy into (I25 in this example).

When the MONTH entry is made manually in the first work week of the production scheduling sheet, the appropriate MONTH entry is calculated and entered in the the remaining sequential weeks. The calculation is performed using the MIN function and the LOOKUP function with reference tables.

The MIN function selects the minimum value from a list of values presented. The first value in the list will be generated by a LOOKUP value being added to the previous week's MONTH entry. First, seven is added to the MONDAYS DATE entry from the previous week to advance it one week. The result is divided by the days in the month, taken from the DAYS/MTH entry of the previous week. The result of this division will be a fraction less than one, a number equal to one, or a number greater than one. This number is compared to the values in TABLE B. When the number is one or less than one, zero will be added to the previous week's MONTH entry. When the number is greater than one, the value one will be added to the previous week's MONTH entry.

The MIN function will select the lesser of the two values listed and display it as the appropriate MONTH entry. When the advancement is less than the remaining days in the month, the MIN value will be the same as the previous MONTH entry. When the advancement is more than the remaining days in the month, the MIN value will be the previous MONTH entry plus one. When the previous MONTH entry is 12 and the advancement is more than the remaining days in the month, the MIN value will be one.

Place your cursor on B14 and type:

@MIN(	(select the minimum value in the list to follow)
B3	(coordinate to add to)
+	(add)
@LOOKUP(	(start LOOKUP function)
F3	(coordinate to add to)
+	(add)
7	(value to add)
/	(divide)
I3	(coordinate containing divider value)
,	(comma, separates value to be looked up from table coordinates)
E55	(first coordinate of the reference table)
.	(ellipsis ... indicating from-to)
F55	(last coordinate in reference table)
)	(parenthesis-separates calculations within a formula)
,	(comma, separates values in list)
@LOOKUP(	(start LOOKUP function)
B3	(coordinate to add to)
+	(add)
@LOOKUP(	(start LOOKUP function)
F3	(coordinate to add to)
+	(add)
7	(value to add)
/	(divide)
I3	(coordinate containing divider value)
,	(comma-separates value to be looked up from table coordinates)

E55	(first coordinate of the reference table)
.	(elipsis ... indicating from-to)
F55	(last coordinate in reference table)
)	(parenthesis-separates calculations within a formula)
,	(comma-separates values in list)
H55	(first coordinate of the reference table)
.	(elipsis ... indicating from-to)
I55))	(last coordinate in reference table)
RETURN	(actuate-enters the formula into the coordinate)

Calculating MONDAYS DATE in each sequential week following the manual entry of the MONTH and MONDAYS DATE in the first week, is accomplished using the LOOKUP function with reference tables, and the INTEGER function.

The first calculation in the formula adds seven days to the previous MONDAYS DATE entry to advance it one week. It then divides that number by the number of days in the month determined by the DAYS/MTH entry in the previous week. When the advancement is less than the number of days remaining in the month, the result of this calculation will be a fraction (representing the days used up in that month). When the advancement is more than the remaining days in the month, the result will be the value one and a fraction (the fraction portion representing the number of days advanced into the next month). When the new date falls on the last day of the month, the result will be one, with no fractional value.

In a later calculation, the INTEGER (the whole number to the left of the decimal) of above result will be subtracted from the value, and the remaining value multiplied by the day in the month to determine the appropriate new date. When the advancement is less than the number of days remaining in the month, that INTEGER will be zero; when more than the days remaining in the month, the INTEGER will be one. In either case, when the INTERGER is subtracted, the fractional portion will remain, which is what you need for your calculation

When the new date falls on the last day of the month, the INTEGER will be 1, with no fractional value. When this is the case, no value is left for computation when the INTEGER is subtracted. To correct for this condition, the LOOKUP

function is used in your second calculation to compare the first calculation result to a table and determine if it is less than one or greater than one, in which case, a zero value will be added to the result. When the result is equal to one, the value one will be added, to give the value two. Now, when the new date is the last day in the month and the INTEGER one is subtracted in the third calculation, the value one will remain to be multiplied by the days in the month (resulting in the date of the last day in the month).

The third calculation adds seven days to the previous MONDAYS DATE entry and divides the result by the number in the DAYS/MTH entry for the previous week. The INTEGER function then selects and retains the whole number to the left of the decimal place. The result will be one or zero. This value is subtracted from the result of the previous calculations.

The final calculation multiplies the result of the first three calculations by the number of days in the month from the DAYS/MTH entry from the previous week. The result will be the appropriate date of the month, which will be displayed as MONDAY'S DATE.

Place your cursor on F14 and type:

((F3	(coordinate to add to)
+	(add)
7	(value to add)
/	(divide)
I3	(coordinate containing diviser value)
)	(parenthesis-separates calculations within a formula)
+	(add)
@LOOKUP(	(start LOOKUP function)
F3	(coordinate to add to)
+	(add)
7	(value to add)
/	(divide)
I3	(coordinate containing diviser value)
,	(comma-separates value to be looked up from table coordinates)
A55	(first coordinate of the reference table)
.	(elipsis ... indicating from-to)
C55	(last coordinate in reference table)
))	(parentheses-separates calculations within a formula)

-	(subtract)
(@INT	(integer-select the value to the left of the decimal place)
(F3	(coordinate to add to)
+	(add)
7	(value to add)
/	(divide)
I3	(coordinate containing divider value)
)))	(parentheses-separates calculations within a formula)
*	(multiply)
I3	(coordinate containing multiplier value)
RETURN	(actuates-enters the formula into the coordinate)

Now, copy the MONTH, MONDAY'S DATE and DAYS/MTH formulas just entered into the appropriate positions in following sequential weeks, one week at a time.

Place your cursor on B14 and type:

/R	(start the REPLICATE command)
I14	(copy all entries across columns B14 to I14)
RETURN	(actuate-prepare to receive additional instructions)
B25	(first coordinate where you wish to copy the formulas across columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
R	(tells the command to copy the coordinate address in the formula to its new location without change)
R	
N	
N	
N	
N	

R
R
R
R

N
N

R
R
R
R

N
N

Next, enter the formulas in the PLANT PRODUCTION SUMMARY that will transfer the MONTH, MONDAY'S DATE and the hourly values from the weekly production schedule totals.

Place your cursor on A41 and type:

+	(prepares the coordinate to accept a numeric expression)
B3	(coordinate containing value to transfer)
RETURN	(actuate-enters formula into coordinate)

Place your cursor on A42 and type:

+	(prepares the coordinate to accept a numeric expression)
B14	(coordinate containing value to transfer)
RETURN	(actuate-enters formula into coordinate)

Place your cursor on A43 and type:

+	(prepares the coordinate to accept a numeric expression)
B25	(coordinate containing value to transfer)
RETURN	(actuate-enters formula into coordinate)

Place your cursor on B41 and type:

+ (prepares the coordinate
to accept a numeric
expression)

F3 (coordinate containing
value to transfer)
RETURN (actuate-enters formula
into coordinate)

Place your cursor on B42 and type:

+ (prepares the coordinate
to accept a numeric
expression)
F14 (coordinate containing
value to transfer)
RETURN (actuate-enters formula
into coordinate)

Place your cursor on B43 and type:

+ (prepares the coordinate
to accept a numeric
expression)
F25 (coordinate containing
value to transfer)
RETURN (actuate-enters formula
into coordinate)

Place your cursor on C41 and type:

+ (prepares the coordinate
to accept a numeric
expression)
C12 (coordinate containing
value to transfer)
RETURN (actuate-enters formula
into coordinate)

Place your cursor on C42 and type:

+ (prepares the coordinate
to accept a numeric
expression)
C23 (coordinate containing
value to transfer)
RETURN (actuate-enters formula
into coordinate)

Place your cursor on C43 and type:

+	(prepares the coordinate to accept a numeric expression)
C34	(coordinate containing value to transfer)
RETURN	(actuate-enters formula into coordinate)

Place your cursor on C45 and type:

@SUM(	(add)
C40	(first coordinate of the row you wish to add)
.	(elipsis ... indicating from-to)
C44	(last coordinate of the row you wish to add)
RETURN	(actuate-enters formula into coordinate)

Now, copy the prior four formulas entered into appropriate positions in columns to the right.

Place your cursor on C41 and type:

/R	(start the REPLICATE command)
C45	(copy all entries from C45 to C41)
RETURN	(actuate-prepare to receive additional instructions)
D41	(first coordinate where you wish to copy formulas across columns)
.	(elipsis ... indicating from-to)
I41	(last coordinate where you wish to copy formulas across columns)
RETURN	(actuates the command)
R	(tells the command to copy the coordinate address in the formula relative to its new location)
R	
R	
R	
R	

It will be necessary to replace the SUM formula in coordinate H45 with the AVERAGE function to obtain the correct percentage ratio of maximum hours used.

Place your cursor on H45 and type:

@AVERAGE(	(average numeric
	values in following
	list)
H40	(first coordinate of
	list)
.	(elipsis ... indicates
	from-to)
H44	(last coordinate of
	list)
RETURN	(actuate-enters formula
	into coordinate)

MAKING SCHEDULE SHEET ENTRIES

Your production scheduling sheet is now ready for use. To perform the following operations, type in the entries in figure 3 exactly as they are shown.

NOTE: Never enter values in coordinates containing formulas, or the formulas will be erased.

RESCHEDULING ENTRIES

Your entire production scheduling sheet cannot be viewed on your computer screen because it is too long. To allow you to view the PLANT PRODUCTION SUMMARY as you move work orders from one week to another for rescheduling, you will now utilize the WINDOW command to split the screen horizontally in two. The PLANT PRODUCTION SUMMARY will be displayed in the lower window, and will remain stationary. The upper window will be used to scan the entire production scheduling sheet, selecting portions where changes will be made. The split window format is illustrated in figure 4.

Position line 46 as the last line displayed on your screen. This will position your PLANT PRODUCTION SUMMARY in the lower half of your screen.

Place your cursor on A35 and type:

/W	(start WINDOW command)
H	(split window
	horizontally)
/W	(start WINDOW command)
S	(scroll windows in
	synchronization)

NOTE: Your cursor will be located in the upper window. You may move it from one window to the other by depressing the semicolon key (;).

To demonstrate how the production scheduling sheet recalculates values when a work order is moved for rescheduling, move the MCGRAY order from week one to week three.

Place your cursor on A9 and type:

/M	(start MOVE command)
A31	(row where entry will be moved to)
RETURN	(activates command)

	A	B	C	D	E	F	G	H	I	J	K	L	
1	MAX NUMBER OF SHOP HOURS IN A WEEK =					200							
2	-----												
3	MONTH	10	MONDAYS DATE			5	DAYS/MTH. 31						
4	-----												
5			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.				
6	JOB NO	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS				
7	-----												
8	A300	JOHSON	45	58	25	5	133	67					
9	D325	MCGRAY	15	25	30		70	35					
10	D450	MIS CO.	17	12	15		44	22					
11	=====												
12	TOTALS		77	95	70	5	247	124	47				
13	-----												
14	MONTH	10	MONDAYS DATE			12	DAYS/MTH. 31						
15	-----												
16			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.				
17	JOB NO	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS				
18	-----												
19	A150	MILFORD	25	31	18	1	75	38					
20	A550	RESTEASY	14	22	27	1	64	32					
21	D600	HARTFORD	16	15	15	1	47	24					
22	=====												
23	TOTALS		55	68	60	3	186	93	-14				
24	-----												
25	MONTH	10	MONDAYS DATE			19	DAYS/MTH. 31						
26	-----												
27			PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.				
28	JOB NO.	CUSTOMER	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS				
29	-----												
30	A800	RED FOX	15	20	12	1	48	24					
31	D425	WILLIT	13	15	15	1	44	22					
32	A225	DONIT	12	12	5	1	30	15					
33	=====												
34	TOTALS		40	47	32	3	122	61	-78				
35	-----												
36	PLANT PRODUCTION SUMMARY												
37	-----												
38		MONDAYS	PATTERN	CUT	ASSEM-	SHIP	EST.	PCT OF	HRS VS.				
39	MONTH	DATE	MAKING	GLASS	BLE		HOURS	MAX HRS	MAX HRS				
40	-----												
41	10	5	77	95	70	5	247	124	47				
42	10	12	55	68	60	3	186	93	-14				
43	10	19	40	47	32	3	122	61	-78				
44	=====												
45	TOTALS		172	210	162	11	555	93	-45				
46	-----												
47	-----												
48	DAYS IN THE MONTH TABLE												
49	-----												
50	1	2	3	4	5	6	7	8	9	10	11	12	
51	31	28	31	30	30	30	31	31	30	31	30	31	
52	-----												
53	TABLE "A"			TABLE "B"			TABLE "C"						
54	-----												
55	.001	1	1.001		.001	1.001		0	13				
56	0	1	0		0	1		13	1				
57	-----												

FIGURE 3.

	A	B	C	D	E	F	G
5			PATTERN	CUT	ASSEM-	SHIP	EST.
6	JOB NO	CUSTOMER	MAKING	GLASS	BLE		HOURS
7	-----						
8	A300	JOHNSON	45	58	25	5	133
9	D325	MCGRAY	15	25	30		70
10	D450	MIS CO.	17	12	15		44
11	=====						
12	TOTALS		77	95	70	5	247
	A	B	C	D	E	F	G
36	PLANT PRODUCTION SUMMARY						
37	-----						
38		MONDAYS	PATTERN	CUT	ASSEM-	SHIP	EST.
39	MONTH	DATE	MAKING	GLASS	BLE		HOURS
40	-----						
41	12	23	77	95	70	5	247
42	12	30	55	68	60	3	186
43	1	6	40	47	32	3	122
44	=====						
45	TOTALS		172	210	162	11	555
46							

Split Screen Before
Work Order Move

	A	B	C	D	E	F	G
28	JOB NO.	CUSTOMER	MAKING	GLASS	BLE		HOURS
29	-----						
30	A800	RED FOX	15	20	12	1	48
31	D325	MCGRAY	15	25	30		70
32	D425	WILLIT	13	15	15	1	44
33	A225	DONIT	12	12	5	1	30
34	=====						
35	TOTALS		55	72	62	3	192
	A	B	C	D	E	F	G
37	PLANT PRODUCTION SUMMARY						
38	-----						
39		MONDAYS	PATTERN	CUT	ASSEM-	SHIP	EST.
40	MONTH	DATE	MAKING	GLASS	BLE		HOURS
41	-----						
42	12	23	62	70	40	5	177
43	12	30	55	68	60	3	186
44	1	6	55	72	62	3	192
45	=====						
46	TOTALS		172	210	162	11	555

Split Screen After
Work Order Move

FIGURE 4

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE command.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	(start insert command)
R	(insert row; actuates command)

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	(start STORAGE command)
S	(save)
FILENAME	(name of file; do not type spaces between words)
RETURN	(actuate command)

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle you wish to print and type:

/P	(start PRINT command)
P	(printer)

Type in the lower-right coordinate of the worksheet area rectangle you wish to print and press:

RETURN	(actuate command)
--------	-------------------

EXERCISE 5

DESCRIPTION

Illustrated in this exercise are the abilities to utilize the calculating sequence of VisiCalc to calculate values for entry in a table before using that table for reference, and to select values from a set of tables for use in calculations.

To demonstrate these abilities, an estimating sheet has been designed for a pipe manufacturer. Following entry of the size parameters and the the quantity and grade of material to be used, the estimating sheet will make a series of calculations automatically. Displayed as a result of the calculations will be the appropriate manufacturing machine to use, the amount and cost of material required, manufacturing time and cost, and total job costs.

Operations Used

1. Setting Up The Format
2. Entering Mathematical Formulas
3. Entering Parameters
4. Making Additional Entries
5. Saving
6. Printing

Functions Used.

LOOKUP	
SUM	
PI	(3.1415926536)
INT	(integer)

Commands Used.

REPEATING LABEL	
FORMAT	(R = right justify)
STORAGE	(save)
INSERT	(R = row)
BLANK	(delete entry)

SETTING UP THE FORMAT

To set up your estimating sheet, copy figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

To enter your column headings, type:

```
/F      (start the FORMAT command)
R      (justify right)
```

Type in your column title.

Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column label into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your estimating sheet, place your cursor in the left-most column of the row where you want the line, and type:

```
/-      (start REPEAT LABEL command)
-      (label to be repeated)
RETURN  (actuates the command)
```

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the additional columns, place your cursor in the column and repeat the above sequence.

To enter a double-dashed line on your estimating sheet, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their locations are illustrated in figure 2.

The first two formulas you will enter will generate the values for TABLE A. The diameter and length parameters of the pipe to be manufactured are used to select which machines are appropriate for the job from MACHINE TABLES 1 and 2. The resulting selections will appear in TABLE A, and will be used in a later calculation.

	A	B	C	D	E	F	G	H	I	J	K
1	MATERIAL GRADE :::										
2	QUANTITY ::::::::::										
3	LENGTH ::::::::::										
4	DIAMETER ::::::::::										
5											
6		MACHINE TO USE=									
7		TOTAL SQ.FT.NEEDED									
8		MANUFACTURE TIME									
9		MANUFACTURE COST									
10		MATERIEL COST									
11			=====								
12		TOTAL JOB COST									
13											
14											
15		-----									
16		TABLE "A"									
17		-----									
18		1									
19		2									
20		-----									
21		TABLE "B"									
22		-----									
23		1	1								
24		4	2								
25		5	1								
26		-----									
27		MACHINE TABLE # 1									
28		-----									
29		1	1								
30		2	2								
31		3	3								
32		4	QNA								
33		5	7								
34		-----									
35		MACHINE TABLE # 2									
36		-----									
37		0	4								
38		20	5								
39		25	6								
40		-----									
41		MACHINE HOURLY		MACHINE PRODUCTION			MAT'L GRADE			PERCENT OF COST	
42		COST TABLE		RATE TABLE			COST/SQFT TABLE			MARKUP TABLE	
43		MACHINE # PRICE/HR		MACHINE # SQFT/HR			-----			-----	
44							100 9.55			0 2.5	
45		1 25.55		1 36			150 6.35			100 2.25	
46		2 30.55		2 25			200 5.63			200 2	
47		3 20.75		3 45			250 7.88			250 1.75	
48		4 41.75		4 12			300 6.75			300 1.55	
49		5 56.95		5 69						500 1.25	
50		6 18.95		6 78							
51		7 125.25		7 95							
52		-----		-----							

FIGURE 1.

	A	B	C	D	E	F	G	H	I	J	K
1	MATERIAL GRADE :::		300								
2	QUANTITY ::::::::::		1								
3	LENGTH ::::::::::		1								
4	DIAMETER ::::::::::		1								
5											
6	MACHINE TO USE=		1								
7	TOTAL SQ.FT.NEEDED		1								
8	MANUFACTURE TIME		1								
9	MANUFACTURE COST		25.55								
10	MATERIEL COST		16.88								
11											
12	TOTAL JOB COST		42.425								
13											
14											
15											
16	TABLE "A"										
17											
18		1	1								
19		2	4								
20											
21	TABLE "B"										
22											
23		1	1								
24		4	2								
25		5	1								
26											
27	MACHINE TABLE # 1										
28											
29		1	1								
30		2	2								
31		3	3								
32		4	NA								
33		5	7								
34											
35	MACHINE TABLE # 2										
36											
37		0	4								
38		20	5								
39		25	6								
40											
41	MACHINE HOURLY										
42	COST TABLE										
43	MACHINE # PRICE/HR										
44											
45		1	25.55								
46		2	30.55								
47		3	20.75								
48		4	41.75								
49		5	56.95								
50		6	18.95								
51		7	125.25								
52											

FIGURE 2.

Place your cursor on B18 and type:

@LOOKUP(	(start LOOKUP command)
C4,	(value to look up)
A29	(first coordinate of reference table)
.	(elipsis-indicating from-to)
A33)	(last coordinate of reference table)
RETURN	(actuate-enters the formula into the coordinate)

Place your cursor on B19 and type:

@LOOKUP(	(start LOOKUP command)
C3,	(value to look up)
A37	(first coordinate of reference table)
.	(elipsis-indicates from-to)
A39)	(last coordinate of reference table)
RETURN	(actuate-enters formula into the coordinate)

The third formula first employs a LOOKUP within a LOOKUP function to compare the diameter of the pipe to a set of parameters in TABLE B and generate a reference number. That number is then used in TABLE A by the second LOOKUP function to select the appropriate machine to be used in the manufacturing operation.

Place your cursor on D6 and type:

@LOOKUP(	(start LOOKUP command)
@LOOKUP(	(start LOOKUP command)
C4,	(value to look up)
A23	(first coordinate of reference table)
.	(elipsis-indicating from-to)
A25)	(last coordinate of reference table)
,	(comma-separates calculations within a formula)
A18	(first coordinate of reference table)
.	(elipsis-indicating from-to)
A19)	(last coordinate of reference table)
RETURN	(actuate-enters the formula into the coordinate)

To determine the amount of flat material required to manufacture the pipe, the next formula first determines the pipe circumference in inches by multiplying the diameter times PI (3.1415926536). The circumference is then multiplied by the pipe length to find the material in one piece. The result is multiplied by the quantity to determine the total amount of material needed, then divided by 144 to convert the answer to square feet. The final quantity is carried to the next square foot by adding one and using the INTEGER function to select only the whole number to the left of the decimal place.

Place your cursor on D7 and type:

@INT(	(select the value to the left of the decimal point)
C4	(value to be multiplied)
*	(multiply)
@PI	(3.1415926536 - multiplier)
*	(multiply)
C3	(multiplier)
*	(multiply)
C2	(multiplier)
/	(divide)
144)	(diviser)
+	(add)
1	(value to add)
RETURN	(actuate-enters the formula into the coordinate)

The MANUFACTURING TIME to produce the number of pipes indicated is determined by dividing the square feet of material by the number of square feet per hour the selected machine will process. The LOOKUP function is used to find the production rate of the selected machine in the MACHINE PRODUCTION RATE TABLE. To round out the result to the next whole hour, one is added to the answer and the INTEGER function is used to select only the whole number to the left of the decimal point.

Place your cursor on D8 and type:

@INT(	(select the value to the left of the decimal point)
D7	(value to be divided)
/	(divide)
@LOOKUP(	(start LOOKUP function)
D6,	(value to be looked up)
D45	(first coordinate of the reference table)
.	(elipsis ... indicating from-to)

D51	(last coordinate of the reference table)
))	(parentheses-separates calculations within a formula)
+	(add)
1	(value to be added)
RETURN	(actuate-enters the formula into the coordinate)

Your next formula will use the LOOKUP function to select the hourly cost rate of the machine being used from the MACHINE HOURLY COST TABLE. It then multiplies that rate times the hours listed for MANUFACTURING TIME to obtain the MANUFACTURING COST.

Place your cursor on D9 and type:

@LOOKUP(	(start LOOKUP function)
D6,	(value to be looked up)
A45	(first coordinate of the reference table)
.	(elipsis ... indicating from-to)
A51	(last coordinate of the reference table)
)	(parenthesis-separates calculations within a formula)
*	(multiply)
D8	(multiplier)
RETURN	(actuate-enters the formula into the coordinate)
/F	(start FORMAT command)
\$	(display values in dollars and cents format)

Now enter the formula to calculate the MATERIAL COST. The LOOKUP function is first used to determine the material purchase cost from the MAT'L GRADE COSTS/SQ FT table. A second LOOKUP function is used to determine the percentage rate of the pricing markup from the PERCENT OF COST MARKUP table. The resulting values from these two LOOKUP functions are multiplied and the answer multiplied by the TOTAL SQ. FT. NEEDED value to obtain the MATERIAL COST.

Place your cursor on D10 and type:

@LOOKUP(	(start LOOKUP function)
C1,	(value to be looked up)
G44	(first coordinate of the reference table)
.	(elipsis ... indicating from-to)

G48	(last coordinate of the reference table)
)	(parenthesis-separates calculations within a formula)
*	(multiply)
@LOOKUP(	(start LOOKUP function)
D7,	(value to be looked up)
J44	(first coordinate of the reference table)
.	(elipsis ... indicating from-to)
J49	(last coordinate of the reference table)
))	(parenthesis-separates calculations within a formula)
*	(multiply)
D7	(multiplier)
RETURN	(actuate-enters the formula into the coordinate)
/F	(start FORMAT command)
\$	(display values in dollars and cents format)

The final mathematical formula on your estimating sheet will add the total of the values listed for MANUFACTURING COST and MATERIAL COST, and display the answer on the TOTAL JOB COST line.

Place your cursor on D12 and type:

@SUM(	(add)
D9	(first coordinate of the column you wish to add)
.	(elipsis ... indicating from-to)
D11)	(last coordinate of the column you wish to add)
RETURN	(actuate-enters the formula into the coordinate)
/F	(start FORMAT command)
\$	(display values in dollars and cents format)

ENTERING PARAMETERS

Your estimating sheet is now complete. To observe its operations, enter your measurement and material grade values on the appropriate lines at the top of the page (figure 3).

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE command.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	(start insert command)
R	(insert row; actuates command)

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	(start STORAGE command)
S	(save)
FILENAME	(name of file; do not type spaces between words)
RETURN	(actuate command)

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle you wish to print and type:

/P	(start PRINT command)
P	(printer)

Type in the lower-right coordinate of the worksheet area rectangle you wish to print and press:

RETURN	(actuate command)
--------	-------------------

EXERCISE 6

DESCRIPTION

The VisiCalc ability to store selected values onto disk storage and reenter them on a worksheet for accumulating is employed in this exercise. Ledger posting, with the ability to accumulate the postings and add or subtract the resulting value from a balance figure is demonstrated. A method for displaying a zero value in a column prior to ledger entry is featured.

To demonstrate these techniques, a checkbook worksheet has been designed. Deposit and payment entries are made in the checkbook, and the resulting checkbook balance and the totals of all the columns containing entries are automatically calculated. On a monthly schedule, the year to date total is transferred to a disk file for later reentry and repositioning as a cumulative total on the following month's worksheet.

Operations Used

1. Setting Up The Format
2. Entering Mathematical Formulas
3. Posting Entries
4. Monthly Updating
5. Making Additional Entries
6. Saving
7. Printing

Functions Used

SUM
MIN

Commands Used.

REPEATING LABEL	
FORMAT	(R = right justify)
GLOBAL	(\$ = dollar and cents format)
STORAGE	(save)
STORAGE	(#)
REPLICATE	(copy)
INSERT	(R = row)

SETTING UP THE FORMAT

To set up your checkbook, copy figure 1 exactly as it is illustrated, retaining exact row and column locations of all information.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	LAST MONTHS YTD TOTAL ::::												
2	-----												
3	DATE	CHECK #	PAID TO	DEPOSIT	CHECK	CH.BOOK	SAVINGS	CASH ON	RENT	PHONE	SUPPLIES	MISC.	PURCHASE
4					AMOUNT	BALANCE		HAND					
5	-----												
6													
7													
8													
9													
10													
11													
12													
13													
14	=====												
15	CURRENT MONTHS TOTALS ::												
16	NEW YEAR TO DATE TOTAL ::::												

FIGURE 1

To format all locations to display value entries in dollars and cents, type:

```
/G      (start global command)
F       (format)
$       (dollars and cents)
```

To enter your column headings, type:

```
/F      (start the FORMAT command)
R       (justify right)
```

Type in your column title.
Depress your cursor (arrow) key to move to your next location.

Depressing the cursor key in this operation both enters your column title into the location and moves your cursor automatically to your next typing location. Type in the rest of your column headings using the sequence of commands above.

To enter dashed lines on your checkbook, place your cursor in the left-most column of the row where you want the line (line A2 in this example).

Type:

/- (start REPEAT LABEL command)
 - (label to be repeated)
 RETURN (actuates the command)

The column your cursor is on will now have a line of dashes across its width. To extend the dashed line in the same row across the remaining columns,

Type:

/R (start the REPLICATE command)
 RETURN (tells the command to copy the dashed line your cursor is on)
 B2 (the first coordinate in which you wish the dashed line to be extended from)
 . (elipsis ... indicating from-to)
 M2 (the last coordinate in the row you wish the dashed line to be extended to)
 RETURN (actuates the command)

The dashed line will now appear extended across the columns you have indicated by your coordinates. To enter a double-dashed line on the checkbook, repeat the operations above, using the symbol = as your label to be repeated.

ENTERING MATHEMATICAL FORMULAS

You will now begin entering mathematical formulas that will establish the relationships between column and row positions. The formulas and their positions are illustrated in figure 2.

	A	B	C	D	E	F	G	H	I	J	K	L	M	
1	LAST MONTHS YTD TOTAL :::::													
2	-----													
3	DATE	CHECK #	PAID TO	DEPOSIT	CHECK	CH.BOOK	SAVINGS	CASH ON	RENT	PHONE	SUPPLIES	MISC.	PURCHASE	
4					AMOUNT	BALANCE		HAND						
5	-----													
6				=SUM(I6...M6)	0.00	0.00		=MIN(1,D6+E6)*(SUM(D6...D6)+F1-SUM(E6...E6))						
7					0.00	0.00								
8					0.00	0.00								
9					0.00	0.00								
10					0.00	0.00								
11					0.00	0.00								
12					0.00	0.00								
13				=SUM(D5...D14)	0.00	0.00		+D15+F1-E15		=SUM(F15,G15,G1)				
14	-----													
15	CURRENT	MONTHS	TOTALS ::	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
16	NEW YEAR	TO DATE	TOTAL ::::	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
				+D1+D15		+F15		+H15						

FIGURE 2.

Your first formula will add the total of the postings from the RENT column across to the PURCHASE column.

Place your cursor on E6 and type:

@SUM(	(add)
I6	(first coordinate of the row you wish to add)
.	(elipsis ... indicates from-to)
M6)	(last coordinate of the row you wish to add)
RETURN	(actuate-enters the formula in E6)

Your second formula determines the CH. BOOK BALANCE. The MIN function is used to select the lesser of the values, one, or the total of the DEPOSIT and CHECK AMOUNT for the CH. BOOK BALANCE. The resulting value is multiplied by the total of the DEPOSITS , LAST MONTHS YTD TOTAL for the CH. BOOK BALANCE minus the CHECK AMOUNTS to date for the month.

Place your cursor on F6 and type:

@MIN(1,D6+E6)	Select the minimum value, 1 or the total of D6 and E6)
*	(multiply)
(	(parenthesis-separates values within a formula)
@SUM(	(add)
D6	(first coordinate of column to add)
.	(elipsis ... indicating from-to)
D6)	(last coordinate of column to add)
+	(add)
F1	(value to add)
-	(subtract)
@SUM(	(add)
E6	(first coordinate of column to add)
.	(elipsis ... indicating from-to)
E6))	(last coordinate of column to add)
RETURN	(actuate-enters formula into coordinate)

Now copy the formulas in the CHECK AMOUNT and CH. BOOK BALANCE columns down the columns in each row to the double-dashed line.

Place your cursor on E6 and type:

/R	(start the REPLICATE command)
F6	(copy all entries across columns E6 to F6)
RETURN	(actuate-prepare to receive additional instructions)
E7	(first coordinate where you wish to copy the formulas down columns)
.	(elipsis ... indicating from-to)
E13	(last coordinate where you wish to copy the formulas down columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate address in the formula relative to its new to location)
R	
R	
N	(tells the command to copy the coordinate address in the formula in its new location without change)
R	
N	
N	
R	

Next, enter the formula to add the CURRENT MONTHS TOTAL in the DEPOSIT column.

Place your cursor on D15 and type:

@SUM(	(add)
D5	(first coordinate of the column you wish to add)
.	(elipsis ... indicates from-to)
D14)	(last coordinate of the column you wish to add)
RETURN	(actuate-enters the formula in D15)

Your next formula will add the LAST MONTHS YTD TOTAL in the DEPOSIT column to the CURRENT MONTHS TOTAL in that same column to provide the NEW YEAR TO DATE TOTAL.

Place your cursor on D16 and type:

+	(prepares the coordinate to accept a numeric expression)
D1	(coordinate to add)
+	(add)
D15	(coordinate to add)
RETURN	(actuate-enters the formula in D16)

Now, copy the two formulas you just entered across under the remaining columns to the right on your worksheet.

Place your cursor on D15 and type:

/R	(start the REPLICATE command)
D16	(copy all entries down columns D15 to D16)
RETURN	(actuate-prepare to receive additional instructions)
E15	(first coordinate where you wish to copy the formulas across columns)
.	(elipsis ... indicating from-to)
M15	(last coordinate where you wish to copy the formulas across columns)
RETURN	(actuate the command)
R	(tells the command to copy the coordinate address in the formula relative to its new to location)
R	
R	

The CH. BOOK BALANCE and CASH ON HAND columns use special formulas to obtain totals on their CURRENT MONTH TOTAL and NEW YEAR TO DATE TOTAL lines. For this reason, you will now replace the formulas in those locations.

Place your cursor on F15 and type:

+	(prepares the coordinate to accept a numeric expression)
D15	(coordinate containing value to add)
+	(add)

F1	(coordinate containing value to add)
-	(subtract)
E15	(coordinate containing value to subtract)
RETURN	(actuate-enters formula in F15)

Place your cursor on F16 and type:

+	(prepares the coordinate to accept a numeric expression)
F15	(coordinate containing value to display)
RETURN	(actuate-enters formula in F16)

Place your cursor on H15 and type:

@SUM(	(add values in the following list)
F15	(coordinate containing value in list)
,	(comma-separates values in list)
G15	(coordinate containing value in list)
,	(comma-separates values in list)
G1)	(coordinate containing value in list)
RETURN	(actuate-enters formula in H15)

Place your cursor on H16 and type:

+	(prepares the coordinate to accept a numeric expression)
H15	(coordinate containing value to display)
RETURN	(actuate-enters formula in H16)

Your blank checkbook worksheet is now complete, containing all the formulas necessary for its operation. Prior to posting entries, save the entire worksheet by transferring it to a disk file for later use.

Now save the worksheet to disk storage.

Type:

/S	(start STORAGE command)
S	(save)
CHECKBOOK	(file name; do not leave spaces between words)
RETURN	(activates command)

POSTING ENTRIES

You may now begin posting entries in your checkbook worksheet to observe its operation. Sample entries are shown in figure 3. You may use them if you wish, to check the operation of your worksheet against the illustration.

NOTES: To enter check numbers as labels, depress the quotation mark (") key prior to the entry, which prepares the coordinate to accept a label expression

Never enter values in coordinates containing formulas, or the formulas will be erased.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	LAST MONTHS YTD TOTAL :::::												
2	-----												
3	DATE	CHECK #	PAID TO	DEPOSIT	CHECK	CH.BOOK	SAVINGS	CASH ON	RENT	PHONE	SUPPLIES	MISC.	PURCHASE
4					AMOUNT	BALANCE		HAND					
5	-----												
6	JUN 2,81			15000.00	0.00	15000.00	1200.00						
7	JUN 25	101	RENTALS		550.00	14450.00			550.00				
8	JUN 25	102	NW BELL		250.00	14200.00				250.00			
9	JUN 30	103	ACME		125.00	14075.00					125.00		
10	JUN30	104	HARDWARE		4500.00	9575.00							4500.00
11					0.00	0.00							
12					0.00	0.00							
13					0.00	0.00							
14	=====												
15	CURRENT MONTHS	TOTALS ::	15000.00	5425.00	9575.00	1200.00	10775.00	550.00	250.00	125.00	0.00	4500.00	
16	NEW YEAR TO DATE	TOTAL ::::	15000.00	5425.00	9575.00	1200.00	10775.00	550.00	250.00	125.00	0.00	4500.00	

FIGURE 3.

MONTHLY UPDATING

To perform the updating process, you will transfer the values in the NEW YEAR TO DATE TOTAL row to a disk storage file. You will later reenter these values into a worksheet for the new month by recalling them from the file.

NOTE: Prior to performing the monthly update, be sure you make arrangements, if desired, for permanent storage of the current worksheet before erasing it from the computer memory.

Place your cursor on D16 (the left-most coordinate of the row you wish to copy into the storage file)

Type:

/S	(start STORAGE command)
#	(tells the command to store the values within the rows and columns)
S	(tells the command to store the file)
CHBK.TOTALS	(file name; do not leave spaces between words)
RETURN	(actuate-save file name)
M16	(right-most coordinate of the row of value entries to be stored)
RETURN	(actuate-save the values within the area indicated by the coordinates)
R	(save the values in row form; executes the command)

When your arrangements for permanent storage of your current worksheet are complete, your next step is to clear the computer memory.

To clear the computer memory, type:

/C	(starts CLEAR command)
Y	(activates CLEAR command)

Next, load your blank checkbook worksheet, saved in a previous operation, from your disk storage file.

To load your blank checkbook worksheet, type:

```

/S          (start STORAGE command)
L          (LOAD-tells the command
           a file is to be loaded)
CHECKBOOK (file name to load)
RETURN     (actuate the command)

```

Now, load the NEWYEAR TO DATE TOTAL values saved from the old checkbook worksheet into the LAST MONTHS YTD TOTAL row on the new worksheet.

Place your cursor on D1 (the left-most coordinate of the row where you wish the values to be reentered)

Type:

```

/S          (start STORAGE command)
#          (tells the command to
           reenter the values as
           stored)
L          (LOAD-tells the command
           a file is to be loaded)
CHBK.TOTALS (name of file to load)
RETURN     (actuate-prepare to
           load file)
R          (load the values in row
           form; executes the
           command)

```

You have now completed your monthly update and have entered the cumulative totals in your new checkbook worksheet, as illustrated in figure 4. You are ready to begin posting entries for the new month.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	LAST MONTHS YTD TOTAL ::::: 15000.00 5425.00 9575.00 1200.00 10775.00 550.00 250.00 125.00 0.00 4500.00												
2	-----												
3	DATE	CHECK #	PAID TO	DEPOSIT	CHECK	CH.BOOK	SAVINGS	CASH ON	RENT	PHONE	SUPPLIES	MISC.	PURCHASE
4					AMOUNT	BALANCE		HAND					
5	-----												
6					0.00	0.00							
7					0.00	0.00							
8					0.00	0.00							
9					0.00	0.00							
10					0.00	0.00							
11					0.00	0.00							
12					0.00	0.00							
13					0.00	0.00							
14	=====												
15	CURRENT MONTHS	TOTALS ::	0.00	0.00	9575.00	0.00	10775.00	0.00	0.00	0.00	0.00	0.00	0.00
16	NEW YEAR TO DATE TOTAL ::::: 15000.00 5425.00 9575.00 1200.00 10775.00 550.00 250.00 125.00 0.00 4500.00												

FIGURE 4.

MAKING ADDITIONAL ENTRIES

To add entries, you will have to add new rows. New entries may be made at the end of the existing list, or alphabetically. All SUM functions that add column totals will automatically adjust to include the new rows as long as you insert the rows between the coordinates in the original formula. Formulas performing other functions within the columns expanded however, will have to be entered into the new entry coordinates in each column where a formula is used. These existing formulas can be copied into the new coordinates individually or by using the REPLICATE command.

To insert a new row, place your cursor on the row you wish to move down and a blank row inserted.

/I	(start insert command)
R	(insert row; actuates command)

You may now begin entering formulas where necessary, then begin making your new entries.

SAVING

In some instances you may wish to store your work format or completed work onto a disk file for later retrieval.

To save the entire worksheet, type:

/S	(start STORAGE command)
S	(save)
FILENAME	(name of file; do not type spaces between words)
RETURN	(actuate command)

PRINTING

You may wish to print a portion or all of your worksheet for filing or distribution.

Place your cursor on the upper-left coordinate of the worksheet area rectangle you wish to print and type:

/P	(start PRINT command)
P	(printer)

Type in the lower-right coordinate of the worksheet area rectangle you wish to print and press:

RETURN	(actuate command)
--------	-------------------

EXERCISE 7

VisiCalc presents an excellent tool for working complex calculations with relative ease when compared to using individual calculator operations for each step. In this exercise, you will modify a mathematical formula to VisiCalc entry format. You will then enter the formula and exercise the computations by changing the formula parameters.

As in the other sections in this book, the intent is to provide an exercise demonstrating VisiCalc functions, as opposed to specific problem solving methods. The formula selected to demonstrate mathematical calculation entry and operation was taken from an engineering handbook. Conversion of the formula to a form that can be entered into the VisiCalc worksheet is illustrated. Identifying and labeling variable parameter locations, and entry and exercise of the formula is demonstrated.

Operations used

1. Converting Mathematical Formulas To VisiCalc Entry Format
2. Identifying and labeling variable parameter locations
3. Entering A Mathematical Formula
4. Entering Calculation Values

Functions Used

COS

SQRT

^

(power of)

Figure 1 illustrates the mathematical formula used in this exercise, along with identification of the parameters used.

Resultant force (R) of two forces, F_1 and F_2 , which make an angle α with each other, the angle between the resultant force R and the force F_1 being θ .

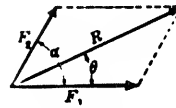


FIG. 495.

$$R = \sqrt{F_1^2 + F_2^2 + 2 F_1 F_2 \cos \alpha}.$$

FIGURE 1.

Your first operation is to prepare the formula for conversion to a form that can be entered into the Visicalc worksheet. To do this, write the calculating operations in sequential form, substituting Visicalc functions where appropriate. The modified mathematical formula is illustrated in figure 2.

NOTE: The SIN, COS and TAN functions are calculated internally by Visicalc in radians. To obtain the natural SIN, COS and TAN values from SIN, COS and TAN calculations in Visicalc, it is necessary to divide by the conversion factor 57.30. The example in this section using the COS function is illustrated with this conversion factor added as a part of the operation.

$$R = @SQRT(((F1^2)+(F2^2))+(2*F1*F2*(@COS(a/57.30))))$$

FIGURE 2.

Now, select locations where you will enter the formula parameter values on your worksheet and type in an identifying label in the column to the left of each one.

In this example, the parameter value for (F1) will be located in B1, and the label in A1. The parameter value for (F2) will be in B2, and its label in A2. The value for (a) will appear in B3; its label in A3. The formula for (R) will be entered in B4. The label for (R) will be in A4.

Your next operation is to type in the identifying labels for your parameter values, as illustrated in figure 3.

	A	B
1	F1	
2	F2	
3	a	
4	R=	

FIGURE 3.

Place your cursor on A1 and type:

F1 (label for parameter F1)

Place your cursor on A2 and type:

F2 (label for parameter F2)

Place your cursor on A3 and type:

a (label for parameter a)

Place your cursor on A4 and type:

R = (label for parameter R)

Now, enter your formula to calculate (R) in B4.

Place your cursor on B4 and type:

@SQRT((calculate the square root of the following value)

((paranthesis-separates calculations in a formula)

(B1 (coordinate where (F1) value is located)

^ (tells the computer to take the previous value to the power indicated)

2) (power)

+ (add)

(B2 (coordinate where (F2) value is located)

^	(tells the computer to take the previous value to the power indicated)
2))	(power)
+	(add)
(2	(value to multiply by)
*	(multiply)
B1	(coordinate where (F1) value is located)
*	(multiply)
B2	(coordinate where (F2) value is located)
*	(multiply)
(@COS(	(cosine)
B3	(coordinate where (a) value is located)
/	(divide)
57.3	(diviser-factor for converting to natural cosine value)
))))	(parentheses-encloses calculations within formula)
RETURN	(actuate-enters formula into B4)

Your formula is now entered on your worksheet and ready to use. To exercise your formula, type in the sample entries illustrated in figure 4. By changing the input parameters, you can continually recalculate the value of (R).

	A	B
1	F1	5
2	F2	5
3	a	25
4	R=	9.762995

FIGURE 4.

\$9.95

\$9.95